

# 2006 Remand Trial Transcripts Part 3

02:40:55 1 A. No.  
 02:40:55 2 Q. Now, you accepted Mr. Muller's definition of who a  
 02:41:04 3 person of ordinary skill in the art is. Correct?  
 02:41:09 4 A. That's correct.  
 02:41:16 5 Q. And you are not a person of ordinary skill in the art.  
 02:41:21 6 Correct?  
 02:41:25 7 A. No, that's not true. That's not true. I have ten  
 02:41:29 8 years of experience working with surge and compressors and  
 02:41:33 9 gas turbines.  
 02:41:37 10 Q. I am sorry, Doctor. You misunderstood the import of  
 02:41:40 11 my question. Let me state it this way. You are far more  
 02:41:43 12 expert than someone of ordinary skill in the art. Correct?  
 02:41:46 13 A. I like to think I have a little bit more expertise.  
 02:41:52 14 Q. Considering all the awards and the training and the  
 02:41:55 15 higher degrees and the experience and the articles and the  
 02:41:57 16 books and the other items that are in your CV, wouldn't you  
 02:42:00 17 agree that you are far more expert in this field than  
 02:42:03 18 somebody of ordinary skill in the art?  
 02:42:06 19 A. I have a bit more skills.  
 02:42:09 20 Q. You were here for the opening, weren't you, Doctor?  
 02:42:12 21 A. Yes.  
 02:42:15 22 Q. The opening statements yesterday?  
 02:42:18 23 A. Yes.  
 02:42:21 24 MR. KRUPKA: Mr. Schlaifer, is it possible to  
 02:42:24 25 put up Hamilton Sundstrand Demonstrative Exhibit No. 215?

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02:42:45 1 BY MR. KRUPKA:  
 02:42:48 2 Q. Do you remember seeing this during the opening  
 02:42:51 3 yesterday?  
 02:42:54 4 A. It looks familiar. I was sitting at a very oblique  
 02:42:57 5 view so I couldn't read what was up there.  
 02:43:00 6 Q. Can you tell me what portions of the APS 3200 meet the  
 02:43:03 7 so-called inlet guide vane limitation of Claim 19 that is  
 02:43:06 8 shown there?  
 02:43:09 9 MR. LEVINE: Same objection, Your Honor.  
 02:43:12 10 Outside the scope of his opinions. We are getting the same  
 02:43:15 11 thing again.  
 02:43:18 12 THE COURT: Mr. Krupka.  
 02:43:21 13 MR. KRUPKA: Your Honor, again, it is as to  
 02:43:24 14 whether or not that was relevant to his determination of  
 02:43:27 15 whether, to someone of ordinary skill in the art in 1982,  
 02:43:30 16 whatever it is that was equivalent would be foreseeable. I  
 02:43:33 17 am just asking him, what is it that was equivalent. That is  
 02:43:36 18 the very basis of this testimony.  
 02:43:39 19 MR. LEVINE: Your Honor, he has said he didn't  
 02:43:42 20 look at whether or not there was infringement by  
 02:43:45 21 equivalence.  
 02:43:48 22 THE COURT: We will establish it one more time.  
 02:43:51 23 Go ahead. You believe this bears on his credibility.  
 02:43:54 24 MR. KRUPKA: Well, Your Honor, let me rephrase  
 02:43:57 25 the question and see if we can't make it a little clearer

02:44:01 1 how it is relevant to this subject matter.  
 02:44:04 2 BY MR. KRUPKA:  
 02:44:07 3 Q. Doctor, what is it in the APS 3200 that is equivalent  
 02:44:10 4 to the inlet guide vane limitation that is set forth on HSC  
 02:44:13 5 Demonstrative Exhibit No. 215 highlighted in yellow there,  
 02:44:16 6 the bottom, the so-called inlet guide vane limitation?  
 02:44:19 7 MR. LEVINE: Same objection. I am also going to  
 02:44:22 8 note, the way it is phrased now, it calls for a legal issue,  
 02:44:25 9 about what was the basis for the jury determination, which  
 02:44:28 10 the Court can look at. Certainly beyond the scope of this  
 02:44:31 11 expert.  
 02:44:34 12 MR. KRUPKA: Your Honor, as I understand it,  
 02:44:37 13 this witness' only purpose is to testify as to the  
 02:44:40 14 foreseeability of the equivalent that was found in this  
 02:44:43 15 case. I am simply asking him what the equivalent is.  
 02:44:46 16 MR. LEVINE: Your Honor, he did it based upon  
 02:44:49 17 looking at assumptions, looking at this technology, was it  
 02:44:52 18 equivalent. Looking at this technology, was it equivalent.  
 02:44:55 19 Not trying to parse through what the basis was for the  
 02:44:58 20 jury's opinion or what the basis was for the Court  
 02:45:01 21 determining things. That's a -- those are legal issues.  
 02:45:04 22 THE COURT: I am not sure that I necessarily  
 02:45:07 23 agree with that. But I am not sure, also -- well, did you  
 02:45:10 24 review this?  
 02:45:13 25 THE WITNESS: Certainly not for the things he is

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02:45:20 1 asking. I can't help there.  
 02:45:23 2 THE COURT: Go ahead, Mr. Krupka. I am going to  
 02:45:26 3 let you go. He didn't review this.  
 02:45:29 4 BY MR. KRUPKA:  
 02:45:32 5 Q. Certainly you saw Claim 19, didn't you, Doctor?  
 02:45:35 6 A. I certainly didn't spend time reading the claims  
 02:45:38 7 there. That was not important to me. I may have seen it.  
 02:45:41 8 But I didn't study that. I took technical issues and worked  
 02:45:44 9 technical issues through. I did not involve myself with the  
 02:45:47 10 legal interpretations, that is not my field. I don't do  
 02:45:50 11 that.  
 02:45:53 12 Q. So you didn't take into account the claim language  
 02:45:56 13 when you were rendering your opinions?  
 02:45:59 14 A. I did not parse through claim language, no.  
 02:46:02 15 Q. Did you go through the 2001 trial record and look at  
 02:46:05 16 the actual evidence that was presented about the operation  
 02:46:08 17 of the APS 3200 and its relating to the claims at issue in  
 02:46:11 18 the case?  
 02:46:14 19 A. And its relationship to the claims, we are in the  
 02:46:17 20 legal world again. No, I am not doing that legal parsing.  
 02:46:20 21 I have seen little bits when it would pertain to a technical  
 02:46:23 22 issue, I have seen bits here. Worked with little bits when  
 02:46:26 23 it pertains to a technical issue. But that's not where my  
 02:46:29 24 emphasis was. We were looking at functionality. How things  
 02:46:32 25 work, how they function, whether a person could see that

03:07:40 1 certain specificity.  
03:07:51 2 Q. It is a name in the computer code that represents a  
03:07:54 3 particular parameter measured in particular places in a  
03:08:05 4 particular load compressor used in a particular APU?  
03:08:06 5 A. All those are particulars. There is nothing to keep a  
03:08:09 6 person from using the same or similar name in any other  
03:08:12 7 machine, too.  
03:08:13 8 Q. I am trying to go the other way.  
03:08:15 9 A. Also, the pressures change with time. You move it to  
03:08:18 10 different locations. So the specificity changed as they  
03:08:22 11 search for good locations.  
03:08:23 12 Q. And as a consequence, what it represents, namely,  
03:08:35 13 delta P over P, changes depending on where it is measured.  
03:08:39 14 Correct?  
03:08:39 15 A. The value changes. That's why you move the taps.  
03:08:42 16 Q. Is there more than one way to control surge in a load  
03:09:03 17 compressor?  
03:09:05 18 A. There are many different ways to control surge in  
03:09:08 19 compressors in general. And in load compressors --  
03:09:13 20 Q. Is that correct in terms of load compressors that are  
03:09:16 21 used in auxiliary power units for aircraft?  
03:09:23 22 A. Yes, if you just cut the definitions tight enough, you  
03:09:27 23 can make something that will follow.  
03:09:30 24 Q. It's not a trick question, Doctor. I am trying to  
03:09:30 25 establish, is there only one way to do it or are there lots

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03:09:37 1 of different ways to do it?  
03:09:43 2 A. If we confine our class to the particular type that we  
03:09:48 3 are talking about, the type of APUs that are used, there is  
03:09:51 4 a lot of similarities. If you take it out to a broader set  
03:09:55 5 of other types, then there are other possibilities. There  
03:10:02 6 are variations.  
03:10:03 7 Q. Now, in preparing your opinion, you actually broadened  
03:10:06 8 it out and included a lot of different types of compressors,  
03:10:10 9 didn't you?  
03:10:10 10 A. Different types of compressors, yes.  
03:10:10 11 Q. You didn't confine yourself to compressors that are  
03:10:13 12 used in APUs?  
03:10:14 13 A. No. I looked at compressors in general.  
03:10:17 14 Q. The references that you rely upon don't even focus on  
03:10:23 15 surge control systems. Correct?  
03:10:25 16 A. Well, for certain questions, I looked for data that  
03:10:30 17 would answer questions.  
03:10:31 18 Q. But for other parts of your -- other pieces of your  
03:10:36 19 opinion, such as measuring delta P over P or other aspects  
03:10:42 20 of your opinion, you just looked at compressors generally,  
03:10:42 21 not necessarily focused on surge control systems?  
03:10:50 22 A. That is true.  
03:10:50 23 Q. With respect to, for example, all the testimony you  
03:10:53 24 gave today about inlet guide vanes, that wasn't limited to  
03:10:56 25 the use of inlet guide lanes veins in a surge control

03:11:00 1 system. Correct?  
03:11:01 2 A. It is not limited.  
03:11:02 3 Q. And what I mean is, the references that you went to to  
03:11:08 4 describe about the inlet guide vanes and what was  
03:11:11 5 foreseeable in that, you did not -- you included reference  
03:11:16 6 that did not involve the use of measurement at inlet guide  
03:11:21 7 vane position in a surge control system?  
03:11:23 8 A. We used Glennon for a lot of -- for some examples.  
03:11:26 9 Yes, Glennon. That's a surge control system.  
03:11:30 10 Q. Doctor, could you answer my question now? Isn't it  
03:11:33 11 correct that the references that you cited were not limited  
03:11:40 12 to the use of inlet guide lane position as part of the surge  
03:11:44 13 control system?  
03:11:45 14 A. Broadly, that's true. It's a mixture of references.  
03:11:48 15 Q. Now, would you agree that surge control systems  
03:12:03 16 typically move the operating point from near surge condition  
03:12:08 17 to a point of higher flow rate located further from the  
03:12:14 18 instability limit?  
03:12:18 19 A. That was a general statement. And I would not.  
03:12:22 20 Q. Could you look at Page 7 of your expert report?  
03:12:26 21 A. Yes. Where would you like me to look?  
03:12:48 22 Q. I am finding it, Doctor, in the second paragraph, the  
03:13:06 23 middle of that paragraph, where you say, This action during  
03:13:10 24 the early decades was typically the use of bleed flow from  
03:13:14 25 the compressor.

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03:13:14 1 A. That's correct.  
03:13:14 2 Q. Which then allowed the compressor to pass more mass  
03:13:18 3 flow and hence move its operating point from the near surge  
03:13:22 4 condition to a point of higher flow rate located farther  
03:13:25 5 from the instability --  
03:13:26 6 A. That's correct. That is different from what you just  
03:13:28 7 asked me.  
03:13:31 8 Q. Is it your testimony that a surge control system does  
03:13:35 9 not typically move the operating point from near surge  
03:13:39 10 condition to a point of higher flow rate?  
03:13:42 11 A. My testimony is that during the early decades --  
03:13:45 12 Q. This is a different question now. I am asking you, is  
03:13:48 13 it your testimony as you sit here today that surge control  
03:13:52 14 systems do not typically move the operating point from near  
03:13:56 15 surge condition to a point of higher flow rate?  
03:13:59 16 A. No, that's not fair, because surge is very, very, very  
03:14:03 17 broad. If you ask me a broad question, I have to give the  
03:14:06 18 professional answer that speaks to the broadest world of  
03:14:09 19 possibilities. We are here talking about APUs in a certain  
03:14:12 20 time period.  
03:14:14 21 Q. Doctor, in fairness, you didn't limit your references  
03:14:16 22 to APUs, did you?  
03:14:19 23 A. I limited my references to a certain period of time.  
03:14:22 24 Q. Doctor, would you answer my question, please. You  
03:14:25 25 didn't limit your references to APUs, did you?

03:14:29 1 A. That's correct.  
 03:14:29 2 Q. You didn't limit your references to surge control  
 03:14:32 3 systems, did you?  
 4 MR. LEVINE: Objection.  
 5 THE COURT: Overruled.  
 03:14:35 6 BY MR. KRUPKA:  
 03:14:38 7 Q. Did you?  
 03:14:38 8 A. No.  
 03:14:38 9 Q. My question, then, is, is it correct that surge  
 03:14:43 10 control systems typically move the operating point from near  
 03:14:48 11 surge condition to a point of higher flow rate?  
 03:14:51 12 A. Many of them typically do, especially in the early  
 03:14:54 13 decades.  
 03:14:55 14 Q. Did surge control systems in 1982 behave differently?  
 03:15:04 15 A. In the broad sense or the specific?  
 03:15:07 16 Q. Surge control systems in the sense of the references  
 03:15:10 17 that you referred to in your expert report, which included  
 03:15:15 18 things that didn't involve APUs and didn't involve a  
 03:15:22 19 specific load compressor for an APU?  
 03:15:25 20 A. They carried a variety of possibilities. But this was  
 03:15:29 21 the most frequent method.  
 03:15:32 22 Q. Now, the surge control system in the L1011, did it  
 03:15:36 23 move the operating point from near surge condition to a  
 03:15:39 24 point of higher flow rate?  
 25 A. Did it move -- repeat, please, sir.

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03:15:43 1 Q. Did the surge control system in the L1011 move the  
 03:15:48 2 operating point from near surge condition to a point of  
 03:15:51 3 higher flow rate?  
 03:15:53 4 A. Yes.  
 03:15:54 5 Q. Did the surge control system of the L1011 attempt to  
 03:16:08 6 maintain minimum compressor bleed flow rates slightly above  
 03:16:14 7 the compressor's surge flow rate?  
 03:16:18 8 A. Repeat, please, once.  
 03:16:19 9 Q. Did the surge control system of the L1011 attempt to  
 03:16:23 10 maintain compressor bleed flow rate slightly above the  
 03:16:29 11 compressor's surge flow rate?  
 03:16:33 12 A. It depends on slightly. A bit above it.  
 03:16:36 13 Q. Was there any effort in the L1011 to try to get it as  
 03:16:40 14 close as possible or to try to stay away from it?  
 03:16:42 15 A. Definitely to stay away from it. I wouldn't be the  
 03:16:47 16 one to testify on how they adjusted all of the little screws  
 03:16:52 17 and throttles and things they have in there, which would  
 03:16:58 18 determine how close it went.  
 03:16:57 19 Q. Indeed, you would like to stay far away from it,  
 20 wouldn't you, to avoid surge?  
 21 A. Well, no. I just don't want to be in surge. But if I  
 03:17:09 22 want to go to lower flows I would like to go as low as I can  
 03:17:12 23 safely.  
 03:17:13 24 Q. What is safe?  
 03:17:14 25 A. A nominal distance from the surge line.

03:17:16 1 Q. What is a nominal distance?  
 03:17:25 2 A. You would like to avoid vibrations, things that could  
 03:17:30 3 disturb people and so forth. So as you start going into any  
 03:17:31 4 precursors of surge you would like to avoid those.  
 03:17:34 5 Q. Do you know whether the L1011 surge control system was  
 03:17:37 6 designed to try to stay slightly above the compressor's  
 03:17:43 7 surge flow rate?  
 03:17:44 8 A. No, I do not.  
 03:17:47 9 Q. Did you read the patents in this case?  
 03:17:50 10 A. I read various parts and one of them I read earlier  
 03:17:55 11 early in the process.  
 03:17:56 12 Q. In connection with the work that you did and the  
 03:18:05 13 opinions that you rendered, did you attempt, or did you take  
 03:18:12 14 into account with respect to your opinions on foreseeability  
 03:18:21 15 any effort to maintain minimum compressor bleed flow  
 03:18:26 16 slightly above the compressor's surge flow?  
 03:18:31 17 A. Slightly above? No. I don't have a definition of  
 03:18:34 18 that yet.  
 03:18:35 19 Q. But in any event, you didn't take that into account in  
 03:18:38 20 rendering your opinions. Correct?  
 03:18:40 21 A. I did not work on slightly and parse out whether it's  
 03:18:44 22 one percent or three percent.  
 03:18:46 23 Q. Now, is it correct, Doctor, that with respect to  
 03:18:48 24 compressor maps, they are not uniquely specified unless the  
 03:18:52 25 inlet temperature and pressure is considered in the map

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03:18:55 1 preparation?  
 03:18:56 2 A. That is fundamental.  
 03:18:57 3 Q. And isn't it correct that the characteristics of a  
 03:19:00 4 machine, a compressor, will depend upon the actual flow  
 03:19:05 5 rate, its inlet pressure, its inlet temperature, and the  
 03:19:09 6 specific geometry used?  
 03:19:11 7 A. Yes.  
 03:19:12 8 Q. Isn't it correct, with respect to the surge control  
 03:19:32 9 system of the L1011, that the position of the inlet guide  
 03:19:42 10 vanes was not used as an input to the shock switch?  
 03:19:47 11 A. To the shock switch.  
 03:19:49 12 Q. Correct.  
 03:19:54 13 A. Yes, but they still work in a similar fashion.  
 03:19:58 14 Q. And what do you mean by similar fashion, that they  
 03:20:01 15 have the same function, to shut down the effect of the surge  
 03:20:06 16 control system when you get near shock?  
 03:20:09 17 A. They do not shut it down. They just ignore it. It  
 03:20:13 18 just ignores it.  
 03:20:14 19 Q. I will take your terminology. So it's your testimony  
 03:20:18 20 that that is what's the same. Correct? That it ignores it?  
 03:20:26 21 A. When the shock switch and shock override comes in, it  
 03:20:30 22 ignores and keeps the valve open, allowing full flow to the  
 03:20:36 23 aircraft, or whatever they have.  
 03:20:39 24 Q. In the L1011, the position of the inlet guide vanes is  
 03:20:45 25 not an input that is part of the surge control system?

03:20:50 1 A. That is not correct.

03:20:52 2 Q. Is the inlet guide vane position measured as part of

03:21:13 3 the L1011 surge control system?

03:21:21 4 A. Not mechanically measured. But fluid dynamically

03:21:22 5 measured.

03:21:27 6 Q. Mr. Schlaifer, could I have you play the clip from Dr.

03:21:35 7 Japiske's deposition beginning at Line 166, going to -- at

03:21:46 8 Line 3, Page 166, Line 3 to Page 167, Line 1?

03:21:49 9 MR. LEVINE: Your Honor, I have it right here.

03:21:52 10 Hold it. Could we have a sidebar?

03:22:33 11 THE COURT: Yes.

03:22:33 12 (The following took place at sidebar.)

03:22:33 13 THE COURT: Your objection, Mr. Levine. It is

03:22:33 14 not impeaching?

03:22:33 15 MR. LEVINE: I will withdraw it.

03:22:33 16 (End of sidebar conference.)

03:22:33 17 BY MR. KRUPKA:

03:22:37 18 Q. Doctor, you gave a deposition in this case. Right?

03:22:42 19 A. That's correct.

03:22:42 20 Q. Back in January?

03:22:43 21 A. That's correct.

03:22:44 22 Q. And you testified there under oath?

03:22:46 23 A. Yes this is Page 166, Line 3 to Page 167, Line 1.

03:22:56 24 "Question: In the L1011 surge control system,

03:22:56 25 is it correct that inlet guide vane position was not

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03:23:02 1 measured as part of the surge control system?

03:23:06 2 "Answer: I don't believe it's correct. The

03:23:09 3 diagram would make it clear.

03:23:12 4 "Question: So it's your testimony that inlet

03:23:16 5 guide vane position was measured as part of the surge

03:23:19 6 control system for the L1011?

03:23:23 7 "Answer: That's not -- that's not anything

03:23:25 8 close to what I was saying a minute ago.

03:23:28 9 "Question: What's your testimony, sir?

03:23:29 10 "Answer: Let's have one question that I can

03:23:31 11 work with. There was two questions.

03:23:33 12 "Question: Don't argue with me, sir. Try to

03:23:35 13 answer my questions. My question is, is the inlet guide

03:23:40 14 vane position measured as part of the L1011 surge control

03:23:43 15 system?

03:23:44 16 "Answer: The inlet guide vane position, to the

03:23:47 17 best of my knowledge, is not measured as part of the control

03:23:49 18 system."

03:23:53 19 BY MR. KRUPKA:

03:23:56 20 Q. Is that your testimony, sir? Is that the testimony

03:23:56 21 you gave?

03:24:02 22 A. That is part of my testimony.

03:24:06 23 Q. Now, the L1011 surge control system was pneumatic.

03:24:06 24 Correct?

03:24:07 25 A. It is pneumatic.

03:24:08 1 Q. And the APS 3200 surge control system is electronic.

03:24:13 2 Correct?

03:24:14 3 A. Principally electronic.

03:24:15 4 Q. Isn't it correct that the difference -- that there is

03:24:21 5 a technological advancement between pneumatic and elect

03:24:25 6 systems for surge control?

03:24:28 7 A. I wouldn't characterize it necessarily as

03:24:31 8 technological advancement. It is more convenient and you

03:24:36 9 can use it that way. Many people look at it as advances,

03:24:38 10 yes, that's true.

03:24:40 11 Q. Isn't it true that electronic surge control systems is

03:24:45 12 technology that was developed after the use of pneumatic

03:24:49 13 surge control systems?

03:24:52 14 A. Electronic is mostly after the pneumatic, that's

03:25:02 15 correct.

03:25:02 16 Q. Is it correct, sir, that the delta P over P

03:25:31 17 measurement in and of itself does not lead to the double

03:25:37 18 solution curve but, rather, you encounter the double

03:25:42 19 solution curve in subsonic, supersonic flow systems that

03:25:46 20 experience supersonic flow and use static pressure

03:25:51 21 differential across the diffuser to measure flow?

03:25:56 22 A. When you measure static pressure across the diffuser,

03:25:59 23 if you have them in the right places, you will get the shock

03:26:02 24 and you will get the double solution curve.

03:26:05 25 Q. So, therefore, the double solution curve is not in and

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03:26:08 1 of itself a function of the DELP over P?

03:26:12 2 A. It is not a function of the parameter you chose there,

03:26:16 3 that's right. It is a physical phenomenon that exists in

03:26:20 4 the diffuser.

03:26:20 5 Q. And whether or not you see the double solution curve

03:26:45 6 will depend on where you measure the static pressure.

03:26:49 7 Correct?

03:26:49 8 A. You say whether or not?

03:26:51 9 Q. Where, will depend on where you measure the static

03:26:55 10 pressure?

03:26:56 11 A. Please repeat the whole question.

03:26:57 12 Q. Yes, be happy to.

03:26:59 13 Is it correct that whether or not you encounter

03:27:03 14 the double solution curve is dependent upon where you

03:27:09 15 measure the static pressure?

03:27:12 16 A. There is some dependence. You can't go putting it

03:27:17 17 outside of the diffuser. You put a static pressure at the

03:27:21 18 throat of the diffuser or near the throat. Then you have a

03:27:24 19 variety of possibilities downstream.

03:27:27 20 But you can't put both on one side of the shock.

03:27:33 21 MR. KRUPKA: Mr. Levine, maybe you would like

03:27:35 22 join me.

03:27:36 23 MR. LEVINE: Sure.

03:27:36 24 MR. KRUPKA: May I approach, Your Honor?

03:27:39 25 THE COURT: Sure.



03:27:39 1 MR. KRUPKA: I would ask Mr. Levine to share  
 03:27:41 2 with us what exhibit I am holding.  
 03:27:44 3 MR. LEVINE: A portion of Defendant's Exhibit  
 4 399.  
 5 MR. KRUPKA: Thank you.  
 03:27:47 6 BY MR. KRUPKA:  
 03:27:48 7 Q. Now, in your direct, Doctor, you identified, after Mr.  
 03:27:53 8 Levine pointed them out here, these holes within the passage  
 03:27:59 9 of one of the diffuser veins. Is that an accurate  
 03:28:05 10 description?  
 03:28:06 11 A. Yes.  
 03:28:06 12 Q. And these four holes in this one specific passage are  
 03:28:12 13 the static pressure taps for this. Correct?  
 03:28:16 14 A. That's correct.  
 03:28:16 15 Q. Which are the two -- there is four holes there.  
 03:28:20 16 Correct?  
 03:28:21 17 A. That's correct.  
 03:28:21 18 Q. Only two are used in connection with the surge control  
 03:28:25 19 system. Correct?  
 03:28:27 20 A. The surge control system.  
 03:28:28 21 Q. Correct.  
 03:28:29 22 A. No.  
 03:28:29 23 Q. How many are used for purposes of measuring, or for  
 03:28:34 24 purposes of inputting to the surge control system?  
 25 A. Three or four of them are in the surge control system.

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03:28:43 1 Q. Okay. Can you tell us which of the four are the  
 03:28:52 2 possibly three that are used? You said three or four are  
 03:28:58 3 used. If it is three, which three?  
 03:29:01 4 A. Let me just think -- for the diagram -- for a second  
 03:29:04 5 in my mind. All four of them -- go ahead.  
 03:29:07 6 Q. Do you have a document that we can refer to? Maybe  
 03:29:11 7 Mr. Levine can refresh our recollection as to which exhibit  
 03:29:15 8 number it is.  
 03:29:18 9 MR. LEVINE: I believe it's Defendant's Exhibit  
 03:29:21 10 105 is the Master Key. There is a diagram in there. It  
 03:29:25 11 should be in your book.  
 03:29:28 12 MR. KRUPKA: I appreciate the help, Mr. Levine.  
 03:29:31 13 We are just trying to get the facts.  
 03:29:32 14 MR. LEVINE: That's all I want to do, too.  
 03:29:42 15 I will say it is a long document.  
 03:29:48 16 MR. KRUPKA: Do we know the page in the Master  
 03:29:51 17 Key? It may be in my notes.  
 03:30:31 18 BY MR. KRUPKA:  
 03:30:32 19 Q. 2-12 was the page that -- the page I marked down was  
 20 2-12.  
 21 A. That is not the diagram I am looking for. But that  
 03:30:48 22 still helps. I want the diagram.  
 03:30:54 23 MR. LEVINE: If I could speak, Your Honor, 2-12  
 03:30:59 24 has some text. The diagram is at SUND 493.  
 03:31:04 25 THE WITNESS: 493.

03:31:13 1 Yes, this is the one that I was referring to  
 03:31:16 2 that I wanted on the video clip. And of these, all are used  
 03:31:26 3 in the surge control system.  
 03:31:28 4 BY MR. KRUPKA:  
 03:31:28 5 Q. And would you agree that all four of those pressure  
 03:31:33 6 tap holes are contained within the confines of the diffuser?  
 03:31:40 7 A. Yes.  
 03:31:58 8 Q. And, Doctor, that is different from where the static  
 03:32:00 9 pressure taps are or measurements are taken -- let me start  
 03:32:15 10 over.  
 03:32:16 11 The locations where the static pressure is  
 03:32:20 12 measured in the L1011 for purposes of surge control are  
 03:32:25 13 different than where the pressure, static pressure  
 03:32:30 14 measurements are taken as inputs to the surge control system  
 03:32:34 15 of the APS 3200. Correct?  
 03:32:37 16 A. They are different. But they won't change the  
 03:32:38 17 inverted-V curve.  
 03:32:41 18 Q. Well, actually, let's talk about that. The inverted-V  
 03:32:45 19 curve for the APS 3200 is different than the inverted-V  
 03:32:48 20 curve for the L1011, isn't it?  
 03:32:52 21 A. Well, on two machines you are going to get two  
 03:32:54 22 slightly different curves. The number is going to be  
 03:32:57 23 slightly different, yes. That will depend on the  
 03:33:01 24 specific --  
 03:33:02 25 Q. And isn't it correct you can manipulate the way you

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03:33:05 1 draw a curve so that it can end up looking however you want  
 03:33:09 2 it to?  
 03:33:09 3 A. To a degree. You are plotting scales.  
 03:33:22 4 Q. Now, did you find anywhere an example of static  
 03:33:30 5 pressure measurements taken within the diffuser and one at  
 03:33:37 6 the exit of the scroll in a load compressor where the  
 03:33:45 7 inputs -- where those pressure measurements are used as  
 03:33:48 8 inputs for a surge control system?  
 03:33:52 9 A. I think I got it. If you would repeat it, I would  
 03:33:55 10 appreciate it.  
 03:33:55 11 Q. We are talking about pressure, static pressure  
 03:33:59 12 measurements as inputs to a surge control system, where one  
 03:34:05 13 static pressure measurement is from within the diffuser, and  
 03:34:09 14 the other static pressure measurement is at the exit of the  
 03:34:13 15 scroll.  
 03:34:14 16 A. Yes. Did I find a case that had pressure taps at  
 03:34:21 17 those two locations and were...  
 03:34:26 18 Q. Inputs to a surge control system.  
 03:34:40 19 A. No, but I don't see a difference of importance.  
 03:34:43 20 Q. Doctor, I don't want to argue with you. I just wanted  
 03:34:46 21 the answer to the question. Thank you.  
 03:35:04 22 MR. KRUPKA: We are getting close to the end,  
 03:35:06 23 Your Honor. Thank you for your patience.  
 03:35:24 24 BY MR. KRUPKA:  
 03:35:26 25 Q. Is it correct that an APU flow increases past the peak

03:42:21 1 Isn't it correct that what this drawing shows is that once  
 03:42:27 2 you get to supersonic speed, the flow remains constant?  
 03:42:33 3 A. The corrected flow based on upstream conditions is  
 03:42:36 4 constant.  
 03:42:41 5 Q. Right. So this is a totally different set of  
 03:42:47 6 parameters than the one that you ended up with on Hamilton  
 03:42:50 7 Sundstrand Exhibit 335?  
 03:42:52 8 A. No, it is not a totally different set.  
 03:42:56 9 Q. I thought this was downstream corrected?  
 03:42:58 10 A. That is downstream corrected flow.  
 03:43:06 11 Q. And if we go back to the Elmo, in this situation, the  
 03:43:13 12 pressure at the end of the diffuser or nozzle does not  
 03:43:14 13 reduce. Correct?  
 03:43:15 14 A. Sorry?  
 03:43:25 15 Q. The pressure at the -- well, let me put up this one  
 03:43:29 16 again, so we can get this straight. HSC Demonstrative  
 03:43:40 17 Exhibit No. 322. The back pressure in Exhibit 332 changes.  
 03:43:41 18 Correct?  
 03:43:42 19 A. Yes, it drops.  
 03:43:46 20 Q. It drops. And that is partly why you get these  
 03:43:48 21 different curves. Correct?  
 03:43:50 22 A. It's part of the picture.  
 03:43:56 23 Q. Now, what about the conditions that are shown in  
 03:43:58 24 Defendant's Exhibit 335 -- excuse me, HSC Demonstrative 335,  
 03:44:00 25 is there back pressure that is accountable for -- is the

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03:44:07 1 change in back pressure accountable for these curves?  
 03:44:10 2 A. The back pressure is dropping down.  
 03:44:15 3 Q. In other words, is it the same set of circumstances as  
 03:44:18 4 you were explaining for HSC Demonstrative 322?  
 03:44:22 5 A. It is the same set of circumstances.  
 03:44:27 6 Q. What you are saying the difference is is that this is,  
 03:44:31 7 you have changed the conditions on the left-hand drawing to  
 03:44:36 8 show downstream corrected flow as opposed to -- if we can go  
 03:44:41 9 back to the uncovered exhibit -- opposed to in the bottom  
 03:44:49 10 right-hand drawing there, which you say is corrected  
 03:44:52 11 upstream flow?  
 03:44:53 12 A. Both are used, and we have, on the placard over there,  
 03:44:57 13 we have examples of each. It doesn't matter which one you  
 03:45:01 14 want to use. There are examples of each of them on that  
 03:45:04 15 placard where they are going both ways. It is all a matter  
 03:45:09 16 of convenience for what people want to use, control system,  
 03:45:12 17 people like to get more of a bell shaped curve, so they  
 03:45:15 18 choose the downstream. That's their preference in the  
 03:45:18 19 industry. That's what we found in the plot, so that's what  
 03:45:21 20 we used.  
 03:45:24 21 Q. But you picked the downstream, whereas this shows the  
 03:45:29 22 upstream, because what you wanted to show was an inverted-V  
 03:45:30 23 curve. Correct?  
 03:45:34 24 A. You get inverted-V curves both ways. It doesn't  
 03:45:34 25 matter. They are both on the placard over there, the

03:45:37 1 magnetic board.  
 03:45:40 2 Q. Well, then, let me ask you.  
 03:45:46 3 MR. LEVINE: For the record, that is  
 03:45:48 4 Demonstrative Exhibit 17.  
 03:46:36 5 BY MR. KRUPKA:  
 03:46:37 6 Q. While we are on the subject of double solution curves,  
 03:46:52 7 other than the L1011 about which you have already discussed,  
 03:46:58 8 is it correct that you are not aware of any surge control  
 03:47:02 9 system for an APU that exhibited a double solution curve  
 03:47:10 10 phenomenon prior to 1982?  
 03:47:13 11 A. Prior to 1982, the L1011 is the example that comes to  
 03:47:18 12 mind.  
 03:47:22 13 Q. Yesterday, you testified that you had four patents and  
 03:47:29 14 one soon to come. Do you remember that?  
 03:47:30 15 A. Yes.  
 03:47:32 16 Q. And you said -- let me make it easier.  
 03:48:22 17 MR. LEVINE: Your Honor, this is improper. If  
 03:48:23 18 he wants to ask him a question now -- he is not impeaching.  
 03:48:26 19 He is showing what he said. Just ask him the question.  
 03:48:31 20 MR. KRUPKA: I am asking the question, Your  
 03:48:33 21 Honor.  
 03:48:33 22 MR. LEVINE: That shouldn't be on the screen.  
 03:48:35 23 THE COURT: Are you attempting to impeach him  
 03:48:36 24 with this?  
 03:48:37 25 MR. KRUPKA: No, Your Honor. I am trying to

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03:48:38 1 remind him of the testimony. I will be happy to do it  
 03:48:43 2 differently.  
 03:48:44 3 BY MR. KRUPKA:  
 03:48:44 4 Q. Is it correct, Doctor, that you have four issued and  
 03:48:55 5 one patent about to issue?  
 03:48:57 6 A. That's correct.  
 03:48:58 7 Q. And is it your testimony that the last four are  
 03:49:11 8 involved with stability and surge control?  
 03:49:15 9 A. The last four, including the one that's about to be  
 03:49:21 10 issued is involved with stability and other flow field  
 03:49:25 11 phenomena and surge problems.  
 03:49:28 12 Q. And your most recent patents are actually on surge  
 03:49:32 13 control mechanisms?  
 03:49:36 14 A. They are on -- the one to be issued and the one that  
 03:49:40 15 came out most recently is on stability mechanisms,  
 03:49:46 16 controlling stability mechanisms that would be involved with  
 03:49:50 17 surge and triggering surge.  
 03:49:53 18 Q. Is it correct that your most recent patents are  
 03:49:56 19 actually on surge control mechanisms?  
 03:50:02 20 A. On surge control mechanisms, the mechanism that I use  
 03:50:07 21 refers to the flow process, that is the mechanism and that  
 03:50:10 22 is true.  
 03:50:13 23 Q. Let's do it this way, since they are your patents.  
 03:50:58 24 MR. KRUPKA: May I approach, Your Honor?  
 03:51:00 25 THE COURT: Yes, you may.

03:51:02 1 BY MR. KRUPKA:

03:51:02 2 Q. Doctor, for the record, why don't we just let me hand  
03:51:12 3 them to you. Then we will start questions. While I am  
03:51:12 4 handing these to your counsel, can you look through these  
03:51:12 5 and tell me which ones are the ones that are your most  
03:52:04 6 recent patents that are actually on surge control  
03:52:09 7 mechanisms.

03:52:16 8 A. The mechanisms of flow involved in the surge processes  
03:52:21 9 are dealt with in various degrees in the last four.

03:52:32 10 Q. Okay.

03:52:33 11 A. I should just state for the record, this is the first  
03:52:35 12 time I have seen the last patent, the fifth one. My check  
03:52:46 13 with our office indicated that that was not going to be  
03:52:48 14 issued for another week or two. So you have done something  
03:52:51 15 rather interesting in getting this one, our patent lawyers  
03:52:54 16 told me it wouldn't be available --

03:52:56 17 MR. LEVINE: Let me interject. He may not be  
03:52:59 18 through the process. This is a publication.

03:53:02 19 THE WITNESS: I see. It says the word  
03:53:03 20 publication. Okay.

03:53:06 21 MR. KRUPKA: I have no problem with Mr. Levine  
03:53:08 22 doing my job for me, Your Honor, by not leaving the witness  
03:53:13 23 misled.

03:53:13 24 BY MR. KRUPKA:

25 Q. All right. I have placed before you the following

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03:53:17 1 documents, U.S. Patent Nos. 3,902,819, 5,368,440, 5,730,580,  
03:53:29 2 6,699,008B2 and U.S. Patent Application publication U.S.  
03:53:43 3 20050152775A1 for the record?

03:53:44 4 A. Yes.

03:53:44 5 Q. Can you, by using the last three digits, tell me which  
03:53:48 6 ones you are talking about are the last four? Is it every  
03:53:54 7 one -- let me try it this one. Is this last four, each one  
03:54:00 8 you are talking about 3,902,819 --

03:54:05 9 A. That is correct.

03:54:05 10 Q. Starting with the U.S. patent application publication,  
03:54:08 11 which is about to issue, are there any claims to a surge  
03:54:30 12 control system?

03:54:35 13 A. I have not reviewed that, any of these recently to  
03:54:38 14 look at the claims to see whether the claim is surge control  
03:54:46 15 system. And that is not my point.

03:54:46 16 Q. Have you ever drafted claims yourself?

03:54:47 17 A. No.

03:54:47 18 Q. And isn't it true that the only discussion of surge in  
03:54:51 19 this is in the background?

03:55:04 20 A. The surge, the mechanisms of the flow process that I  
03:55:07 21 am dealing are there, and we talk about surge there in  
03:55:07 22 various cases. And that's typical of the types of things  
03:55:10 23 that students expect me to include in the classes when I  
03:55:12 24 lecture on this subject.

So these would fit in very well, students would

03:55:15 1 hold me accountable if I did not have this in my classes on

03:55:19 2 stability, surge, surge control, stability, manipulation.

03:55:26 3 It fit in quite properly.

03:55:28 4 Q. Could I ask you to look at 6,699,008 and tell me

03:55:32 5 whether the word surge appears anywhere in the page?

03:55:35 6 A. What are the last digits?

03:55:37 7 Q. 008.

03:55:37 8 A. I can't do that sitting here. It's been checked, and

03:55:40 9 three of these four have the word surge. One of them does

03:55:45 10 not. I think I can help on the one that does not have that.

03:55:48 11 Let me just think for a minute.

03:55:51 12 Q. I will be happy to represent to you, Doctor, that I  
03:55:53 13 did a search on the computer of '008. And I didn't find the  
03:55:58 14 word surge. I think that is probably the one. But you say  
03:56:01 15 that that is a surge control patent?

03:56:03 16 A. No. I am saying it is a patent that deals with surge  
03:56:07 17 stability and the stability mechanisms that go to --  
03:56:10 18 involved in a surge and controlling of surge.

03:56:13 19 Understand, controlling the surge is very broad.

03:56:16 20 There are many, many ways you can control surge in design  
03:56:20 21 and controlling. By making choices, I can control surge in  
03:56:23 22 the surge line in my design work, so I move the surge line  
03:56:27 23 from position A to position B. And that's a type of surge  
03:56:30 24 control.

03:56:31 25 I can do it by working with the flow, like we

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03:56:36 1 see in the later two patents, where we take flow off on the  
03:56:40 2 shroud line and reject it into a different place and we have  
03:56:44 3 built and we have moved the surge line in cases of this  
03:56:47 4 type. That is a type of surge control.

03:56:50 5 Another type of surge control uses the bleed-  
03:56:55 6 back that is typical in these cases. Another type of surge  
03:57:00 7 control just manipulates the rotational speed of a  
03:57:03 8 compressor. So that you can interfere with the surge  
03:57:06 9 process.

03:57:07 10 There are many, many ways. It is a very broad  
03:57:09 11 subject. These would definitely be included in the future  
03:57:14 12 on my lectures on stability and surge and surge control.

03:57:16 13 THE COURT: Is stability or instability a  
03:57:19 14 synonym or are they synonyms for surge?

03:57:22 15 THE WITNESS: They are synonyms for the  
03:57:24 16 initiation, the triggering of the surge, the triggering of  
03:57:29 17 surge.

03:57:34 18 BY MR. KRUPKA:

03:57:35 19 Q. Is it correct that as of 1982 or '83, you are not  
03:57:58 20 aware of anyone, anywhere in the world, who used inlet guide  
03:58:07 21 vane position as an input to a surge control system to lock  
03:58:13 22 out the surge control system when it approached surge, when  
03:58:16 23 the compressor approached surge?

03:58:20 24 A. Well, lockout, we have discussed that word, with some  
03:58:26 25 variance there, that is basically correct. But we still



03:58:30 1 have a similar mechanism in the L1011.  
 03:58:33 2 Q. The similar mechanism in the L1011 had nothing to do  
 03:58:36 3 with inlet guide vane positions. Correct? That's what you  
 03:58:41 4 mean by similar?  
 03:58:43 5 A. Which piece, please?  
 03:58:45 6 Q. What you referred to as the similar mechanism in the  
 03:58:48 7 L1011 had nothing to do with the measurement of inlet guide  
 03:58:50 8 vane positions as an input to that system. Correct?  
 03:58:53 9 A. Is the system the surge control system?  
 03:58:55 10 Q. The system is the shock switch system. Isn't that  
 03:58:58 11 what it is?  
 03:58:59 12 A. There are two systems.  
 03:59:00 13 Q. What does the lockout in the L1011?  
 03:59:03 14 A. What does the lockout? It's the shock switch.  
 03:59:06 15 Q. Right. And the shock switch --  
 03:59:10 16 A. Lockout, just ignore, it's an ignore signal.  
 03:59:14 17 Q. And that mechanism that does that does not have as an  
 03:59:20 18 input anything having to do with inlet guide vane position.  
 03:59:23 19 Correct?  
 03:59:25 20 A. That is correct.  
 03:59:25 21 Q. And the first --  
 03:59:27 22 A. It is all foreseeable.  
 03:59:28 23 Q. The first one you ever saw where the inlet guide vane  
 03:59:35 24 position was used to do that ignore or lockout function was  
 03:59:35 25 the APS 3200?

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03:59:43 1 A. Yes.  
 03:59:43 2 MR. KRUPKA: I have no further questions.  
 03:59:45 3 THE COURT: Why don't we take a short stretch  
 03:59:48 4 break.  
 03:59:48 5 (Recess taken.)  
 04:00:05 6 THE COURT: Okay. Please be seated.  
 04:00:41 7 Redirect, Mr. Levine.  
 04:00:43 8 REDIRECT EXAMINATION  
 04:00:43 9 BY MR. LEVINE:  
 04:00:44 10 Q. Dr. Japiske, I want to look at five areas, please.  
 04:00:48 11 First, you were asked about a person of ordinary skill in  
 04:00:50 12 the art. You testified that you have greater than ordinary  
 04:00:53 13 skill. Do you recall that?  
 04:00:54 14 A. Yes.  
 04:00:54 15 Q. Do you teach or lecture to people who are of ordinary  
 04:00:59 16 skill in the art?  
 04:10:00 17 A. Yes, I do.  
 04:10:00 18 Q. Do you have colleagues at your company who are persons  
 04:10:04 19 of ordinary skill in the art?  
 04:10:05 20 A. Yes.  
 04:10:09 21 Q. Are you familiar with persons of ordinary skill in the  
 04:10:09 22 art?  
 04:10:09 23 A. Very much so.  
 04:10:10 24 Q. When you wrote your opinions, when you expressed your  
 04:10:14 25 opinions earlier about foreseeability, were those expressed

of 50 sheets

04:10:17 1 from the standpoint of a person of ordinary skill in the art  
 04:10:21 2 in 1982?  
 04:10:23 3 A. Yes.  
 04:10:25 4 Q. Let's go to the second topic.  
 04:10:28 5 The second topic is whether we should be limited  
 04:10:35 6 to looking at just APUs. Do you recall you were asked about  
 04:10:36 7 that and you said that you looked beyond just APUs in what  
 04:10:42 8 was in the pre-1982 literature? Right?  
 04:10:44 9 A. That's correct.  
 04:10:45 10 Q. I want to look at the patent, which is Exhibit 30,  
 04:10:47 11 which is one of those documents provided to you by Mr.  
 04:10:51 12 Krupka. And I am not going to -- I am just going to show  
 04:10:59 13 you a page. Maybe you don't need to get it out. Turn your  
 04:11:09 14 attention to the ninth column, Lines 17 to 20. Does the  
 04:11:17 15 '893 patent say that the bleed air control principle -- does  
 04:11:26 16 the '893 patent, Joint Exhibit 30, say at Column 9, starting  
 04:11:32 17 at Line 17, that the bleed air control principles of the  
 04:11:36 18 present invention are applicable to a wide variety of  
 04:11:39 19 compressor bleed applications and are not limited to the APU  
 04:11:42 20 load compressor application described above?  
 04:11:46 21 A. That's correct.  
 04:11:47 22 Q. Okay. Let's go to the third area. You were shown  
 04:11:50 23 some deposition testimony of yours, about the IGV position  
 04:11:58 24 and the use in the L1011. I am going to put that up here.  
 04:12:02 25 This is Page 166 of your deposition.

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04:12:07 1 Specifically, the first question, you were shown  
 04:12:09 2 more of it, but I want to focus on the first question and  
 04:12:12 3 answer, you were shown, in the L1011 surge control system,  
 04:12:16 4 is it correct that the inlet guide vane position was not  
 04:12:18 5 measured as part of the surge control system?  
 04:12:20 6 You said, I don't believe it's correct. The  
 04:12:22 7 diagram would make it clear.  
 04:12:25 8 Now, later in your testimony, when we were  
 04:12:27 9 looking for that diagram in DX-105 and we found it, you made  
 04:12:31 10 some comment like this is the diagram that I was talking  
 04:12:33 11 about.  
 04:12:34 12 Do you recall that?  
 04:12:35 13 A. Yes.  
 04:12:36 14 Q. Now, is the page that we referenced that I will get to  
 04:12:41 15 in one minute in DX-105 the diagram that you were referring  
 04:12:45 16 to at Page 166 of your deposition testimony?  
 04:12:51 17 A. I am lost on Page 166.  
 04:12:54 18 Q. I have up on the screen --  
 04:12:56 19 A. That is the page?  
 04:12:57 20 Q. -- Page 166 of your deposition testimony. Let me  
 04:13:00 21 rephrase the question. Is the diagram that is in DX-105,  
 04:13:06 22 that we will look at in one second, the diagram that you  
 04:13:09 23 looked at with Mr. Krupka, is that the diagram that you were  
 04:13:14 24 referring to on Page 166 of your deposition?  
 04:13:20 25 A. You are going to show me that?

04:28:31 1 MR. LIND: It is right here.  
04:28:35 2 THE COURT: Yes.  
04:28:48 3 MR. LIND: Since all of my witnesses were either  
04:29:52 4 stricken by the Court's order or they chose not to call them  
04:29:52 5 in the last few days, this is what I got. I am milking it  
04:29:55 6 for all it's worth.  
04:29:57 7 THE COURT: The Court will overrule the  
04:29:58 8 objection to 109 as an ancient document exception, or based  
04:30:04 9 upon the ancient document exception.  
04:30:06 10 MR. LIND: So Exhibits 107, 108, 109 --  
04:30:11 11 THE COURT: Except my clerk wants me to rule  
04:30:13 12 that October 1979 is itself hearsay.  
04:30:22 13 MR. PUTNAM: Let me adopt the argument of the  
04:30:25 14 clerk.  
04:30:29 15 THE COURT: Go ahead, Mr. Lind.  
04:30:31 16 MR. LIND: Admitted then are all of 104 except  
04:30:34 17 the last page, 107, 108, 109, 110 and 111.  
04:30:39 18 THE COURT: Any objection, Mr. Putnam?  
04:30:41 19 MR. PUTNAM: Based on the Court's rulings, no.  
04:30:44 20 THE COURT: Are we still jousting about the last  
04:30:46 21 page of 104?  
04:30:47 22 MR. PUTNAM: I believe the Court ruled  
04:30:49 23 tentatively.  
04:30:49 24 THE COURT: I did. Do you want to still wait  
04:30:49 25 and hear from the other witness?

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04:30:53 1 MR. PUTNAM: Yes, Your Honor.  
04:30:54 2 THE COURT: You preserved your objection. I  
04:30:55 3 have overruled it conditionally. Okay.  
04:30:58 4 MR. LEVINE: Your Honor, as our next witness we  
04:31:03 5 call Richard --  
04:31:04 6 THE COURT: I am wondering, Mr. Lind, how long  
04:31:08 7 do we anticipate this witness will take?  
04:31:11 8 MR. LEVINE: Probably about 20, 30 minutes.  
04:31:13 9 THE COURT: Let's break for lunch, take an hour  
04:31:15 10 for lunch.  
04:31:16 11 (Luncheon recess taken.)  
05:36:32 12 THE COURT: Please be seated.  
05:36:50 13 MR. LEVINE: Your Honor, as its next witness,  
05:36:53 14 Hamilton Sundstrand calls Richard Brown.  
05:37:08 15 I have a binder for the witness and for the  
05:37:10 16 Court and for the other side.  
05:37:13 17 THE COURT: Great.  
05:37:21 18 (... RICHARD BROWN having been duly sworn as a  
05:37:28 19 witness, was examined and testified as follows ...)  
05:38:04 20 DIRECT EXAMINATION  
05:38:04 21 BY MR. LEVINE:  
05:38:04 22 Q. Good afternoon. State your name.  
05:38:06 23 A. My name is Richard Brown.  
05:38:07 24 Q. Mr. Brown, where are you currently employed, if  
05:38:10 25 anywhere?

05:38:11 1 A. I am retired.  
05:38:13 2 Q. Where was your last place of employment?  
05:38:16 3 A. Hamilton Standard, Windsor Locks, Connecticut.  
05:38:20 4 Q. What is the relationship between Hamilton Standard and  
05:38:22 5 Hamilton Sundstrand?  
05:38:24 6 A. Some years after I departed from Hamilton Sundstrand,  
05:38:29 7 United Technologies Corporation acquired Sundstrand. And  
05:38:32 8 they combined Hamilton Standard with Sundstrand into a new  
05:38:35 9 entity, known as Hamilton Sundstrand.  
05:38:38 10 Q. How long did you work at Hamilton Sundstrand?  
05:38:40 11 A. I worked there for 29 years.  
05:38:42 12 Q. And can you tell me the years that was, from when to  
05:38:45 13 when?  
05:38:46 14 A. Yes. From the spring of 1963 to the end of 1991.  
05:38:52 15 Q. What type of work did you do at Hamilton Sundstrand?  
05:38:55 16 A. I was an engineer.  
05:38:56 17 Q. Are you familiar with the L1011 aircraft?  
05:39:00 18 A. Yes.  
05:39:01 19 Q. Did Hamilton Sundstrand make an APU for the L1011?  
05:39:06 20 A. Yes, they did.  
05:39:09 21 Q. Who did you sell the APU to, what manufacturer?  
05:39:12 22 A. We sold it to Lockheed.  
05:39:14 23 Q. Did you have a role in the L1011 APU?  
05:39:16 24 A. Yes, I did.  
05:39:17 25 Q. What was your role?

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05:39:18 1 A. I was part of the thermo-analysis group in the design  
05:39:22 2 department. And I was responsible for matching up  
05:39:25 3 horsepowers, air flows, pressure losses, trying to match the  
05:39:30 4 customers' needs to the plane's capability.  
05:39:34 5 Q. Did your role in the L1011 APU include the load  
05:39:38 6 compressor to the APU?  
05:39:39 7 A. I was concerned with the amount of horsepower and flow  
05:39:42 8 performance of the load compressor.  
05:39:44 9 Q. When is it that you worked on the L1011 APU, during  
05:39:48 10 what time frame?  
05:39:49 11 A. Well, it would be at least from the beginning of 1969,  
05:39:53 12 and possibly earlier, through to about 1976.  
05:39:57 13 Q. When did the L1011 go into service, approximately?  
05:40:01 14 A. The L1011 went into service in early 1972.  
05:40:07 15 Q. Is there any part or device in the L1011 APU that is  
05:40:11 16 used to avoid surge?  
05:40:14 17 A. Yes. There is a system consisting of a surge control  
05:40:17 18 and a surge valve.  
05:40:19 19 Q. And how is the surge valve used to avoid surge?  
05:40:24 20 A. When the flow through the compressor approaches a  
05:40:29 21 critical minimum, the control directs the valve to open and  
05:40:35 22 discharge this overload through the engine exhaust, so that  
05:40:38 23 the total flow through the compressor never falls below a  
05:40:42 24 certain value.  
05:40:44 25 Q. How is it that the L1011 APU determined when to open

5:40:48 1 the surge valve to exhaust?

5:40:51 2 A. There was a combination of pressure taps, and they

5:40:57 3 sent pressure signals into a pneumatic controller, and when

5:41:06 4 this controller decided that the flow was approaching a

5:41:10 5 minimum, it would start to open the surge valve so that the

5:41:12 6 flow never fell below that minimum.

5:41:16 7 Q. Where is it that the L1011 measured this these

5:41:16 8 pressures?

5:41:20 9 A. They measure these pressures in the diffuser of the

5:41:21 10 load diffuser.

5:41:21 11 Q. If you look -- I am going to put up on the screen, you

5:41:26 12 have a binder with documents, I need you to look at those as

5:41:28 13 well, I am going to put up Exhibit 105, which is a document

5:41:36 14 called the Master Key document.

5:41:39 15 Are you familiar with this document?

5:41:41 16 A. Yes. I have seen that document.

5:41:42 17 Q. What is this document?

5:41:44 18 A. This document, it's a general introductory volume to

5:41:50 19 explain the functioning of all parts of the APU system to

5:41:56 20 people like airline personnel who would be using it an

5:41:56 21 servicing it. It gives them an overall picture of the whole

42:02 22 system and how it functions.

42:03 23 Q. I want to turn to Page 2-12 in this document. I will

42:07 24 put it on the screen. In the third paragraph, it says that

42:07 25 there are four pressure pick-offs, PS0, PS1, PS2 and PT.

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42:21 1 Were those four pressure pickoffs in the L1011

42:24 2 APU?

42:25 3 A. Yes, they were.

42:26 4 Q. Where were those four pressure pickoffs?

42:30 5 A. They were all drilled passages in one of the diffuser

42:35 6 passages.

42:35 7 Q. What does a pressure pick-off, like the ones described

42:39 8 there, look like?

42:40 9 A. A simple round hole in the surface of the diffuser

42:46 10 passage.

42:47 11 Q. I have on the stand over here Defendant's Exhibit 399.

42:55 12 There are a couple parts of it. Can you tell me

43:02 13 what Defendant's Exhibit 399 is?

43:04 14 A. Yes. That's a load compressor housing.

43:09 15 MS. STEVENSON: Objection, Your Honor.

43:10 16 THE COURT: Basis?

43:11 17 MS. STEVENSON: Lack of foundation. And in Mr.

43:15 18 Brown's deposition he testified that he was not involved in

43:17 19 the design of the diffuser on the APU for the L1011.

43:20 20 MR. LEVINE: Then what he said is, he didn't

43:25 21 design it. He was familiar with it and knew what it looked

43:25 22 like.

43:25 23 THE COURT: Why don't you establish it.

43:26 24 BY MR. LEVINE:

43:27 25 Q. Mr. Brown, are you familiar with the load compressor

05:43:29 1 on the L1011 that you worked on in the early 1970s?

05:43:33 2 A. Yes, I am.

05:43:35 3 Q. Are you familiar with what the diffuser in the load

05:43:37 4 compressor looked like?

05:43:38 5 A. Yes.

05:43:39 6 Q. Can you identify what Defendant's Exhibit 399 is?

05:43:43 7 A. That is a load compressor that's been cut in half.

05:43:46 8 Q. And what is the -- I am holding up a portion of it

05:43:50 9 that's circular with a hole in the middle. What is this

05:43:53 10 part of?

05:43:54 11 A. That is one-half of the diffuser array.

05:43:57 12 Q. And where is the other half of the diffuser array --

05:44:00 13 A. The other half --

05:44:01 14 Q. I am sorry. Let me finish the question before you

05:44:04 15 answer because it's important for the record that we have

05:44:07 16 questions and answers that match each other.

05:44:10 17 So where in Defendant's Exhibit 399 is the other

05:44:15 18 half of the diffuser array?

05:44:18 19 A. The other half of the diffuser array is what is facing

05:44:21 20 us on that stand.

05:44:23 21 Q. Is it the portion with these slightly curved type

05:44:31 22 vanes that are going around?

05:44:33 23 A. Yes.

05:44:36 24 MR. LEVINE: Your Honor, this is an exhibit

05:44:38 25 where there was an objection to authenticity.

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05:44:41 1 MR. LIND: It's been withdrawn.

05:44:44 2 MR. LEVINE: Okay.

05:44:48 3 BY MR. LEVINE:

05:44:49 4 Q. I am now bringing up, whoever wants to cross-examine,

05:45:01 5 if they want to come up with me, the diffuser section of the

05:45:10 6 L1011. I am holding up half of the diffuser section of the

05:45:23 7 L1011 APU from the early 1970s. Is that right?

05:45:27 8 A. Yes.

05:45:28 9 Q. Can you identify where the holes are -- well, let me

05:45:34 10 ask a different question.

05:45:35 11 Do you see any of the pressure taps that you

05:45:38 12 referenced earlier?

05:45:41 13 A. Yes, I can.

05:45:42 14 Q. Can you identify what those pressure taps look like?

05:45:51 15 Maybe for the benefit of me and the Court point out where

05:45:54 16 you are referring?

05:45:55 17 A. Yes. Right in this passage here, there are four

05:45:59 18 holes, about an eighth of an inch diameter, that would go

05:46:04 19 straight in. Those are the four pressure taps we are

05:46:08 20 referring to.

05:46:09 21 Q. What type of pressure was measured in these pressu

05:46:11 22 taps?

05:46:12 23 A. These pressure taps measure static pressure.

05:46:15 24 Q. Now, there are different names that are given in

05:46:19 25 Defendant's Exhibit 105, Page 2-12, to these pressure taps,

06:06:15 1 regarding the L1011 APU as part of his business at Hamilton  
 06:06:20 2 Standard?  
 06:06:20 3 A. Yes, he did.  
 06:06:20 4 Q. More recently, in the last few months, did you go over  
 06:06:30 5 to Hamilton Standard, for now Hamilton Sundstrand, in  
 06:06:30 6 Connecticut, and review a collection of memos from the late  
 06:06:34 7 1960s and early 1970s about the L1011 APU?  
 06:06:39 8 A. Yes, I did.  
 06:06:40 9 Q. Was this exhibit, Defendant's Exhibit 104, in the same  
 06:06:45 10 files as these other memos?  
 06:06:47 11 A. Oh, yes.  
 06:06:47 12 Q. Now I want to turn to the last page of this document,  
 06:06:56 13 which is Figure 9. This is the curve that we have looked at  
 06:07:04 14 several times so far.  
 06:07:07 15 MR. STEVENSON: I object to that statement. Is  
 06:07:10 16 there a question?  
 06:07:11 17 MR. LEVINE: I am about to get into a question.  
 06:07:13 18 I am just explaining the transition.  
 06:07:15 19 BY MR. LEVINE:  
 06:07:16 20 Q. There are two different vertical axes that are on the  
 06:07:19 21 curve. There is one to the left and one on the right. Can  
 06:07:23 22 you tell which curve -- there is two curves. Can you tell  
 06:07:26 23 which curve relates to which axis?  
 06:07:28 24 A. Yes. The curve that has the arrow at the lower part  
 06:07:35 25 of the graph points to the left, and those are the values on

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06:07:38 1 that vertical axis that apply to that curve, where up in the  
 06:07:44 2 top quarter there is an arrow on the other curve pointing to  
 06:07:48 3 the right and that points to the scale on the right-hand  
 06:07:51 4 side.  
 06:07:51 5 Q. If you look at the curve that points to the left, is  
 06:07:54 6 that the curve that goes up and then peaks and then comes  
 06:07:57 7 down?  
 06:07:57 8 A. Yes.  
 06:07:57 9 Q. And what is it that's on the left axis?  
 06:08:01 10 A. Well, that is the delta P over P signal, which is  
 06:08:07 11 based upon PT minus PS1 over PS1.  
 06:08:12 12 Q. Have you seen curves for the L1011 APU in the early  
 06:08:16 13 1970s that were similar to this curve in Figure 9 of  
 06:08:26 14 Defendant's Exhibit 104 that goes up, peaks, and then drops  
 06:08:32 15 down on the right side?  
 06:08:33 16 A. Yes. That is essentially what I have shown on these  
 06:08:35 17 two graphs here, on the graph with the two red curves.  
 06:08:39 18 Q. That is HSC Demonstrative Exhibit No. 18 that the  
 06:08:44 19 witness referred to.  
 06:08:52 20 Now, there are some ranges on the bottom for  
 06:08:52 21 corrected compressor flow. It goes from the first number  
 06:08:54 22 there, at least, 155, up to 250. Do you see that?  
 06:08:54 23 A. Yes, I do.  
 06:08:57 24 Q. Do those -- does that range accurately reflect the  
 06:09:01 25 corrected flow of the L1011 APU as it operated in the early

06:09:06 1 1970s?  
 06:09:07 2 A. Yes, it does.  
 06:09:08 3 Q. I want to show you another document now, which is  
 06:09:12 4 Plaintiff's Exhibit 106. This is a memo from Mr. Rapp to  
 06:09:23 5 Mr. Moser, April 23, 1969. Do you see that?  
 06:09:28 6 A. Yes.  
 06:09:29 7 Q. As of April 23, 1969, was the design of the L1011 APU  
 06:09:37 8 final?  
 06:09:37 9 A. Oh, no.  
 06:09:38 10 Q. Had the L1011 APU even -- had it flown in the air at  
 06:09:42 11 that time?  
 06:09:43 12 A. No.  
 06:09:44 13 Q. Had you seen the double value function as of this  
 06:09:47 14 time?  
 06:09:48 15 A. Not at that time.  
 06:09:48 16 Q. When is it that you first saw the double value  
 06:09:52 17 function?  
 06:09:54 18 A. When they did the tests, as I have plotted on this  
 06:09:58 19 graph here I expect sometime in the 1971 era.  
 06:10:03 20 Q. If we look, I am going to now look at a different  
 06:10:07 21 document, which is Defendant's Exhibit 109, and there is  
 06:10:15 22 some supplements at the top that I want to particularly  
 06:10:17 23 point to, SUND 780.  
 06:10:21 24 A. Yes.  
 06:10:22 25 Q. There is a reference to incorporating a shock switch

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06:10:25 1 to prevent surge control lockout at high flows. There is a  
 06:10:29 2 date listed there of July 6, 1972. What does that date  
 06:10:34 3 relate to?  
 06:10:35 4 A. That date relates to the date that the appropriate  
 06:10:40 5 engineering change, which is 108927, that's when that  
 06:10:55 6 engineering change was finalized and firmly signed off.  
 06:11:01 7 Q. All right. One last topic, and I will be done.  
 06:11:06 8 You mentioned this double value function. What  
 06:11:09 9 was done if anything by Hamilton Standard to address the  
 06:11:12 10 double value function on the L1011 APU?  
 06:11:17 11 A. Hamilton incorporated a device called the shock  
 06:11:21 12 switch.  
 06:11:21 13 Q. What was the shock switch?  
 06:11:23 14 A. Well, they made an additional static pressure hole  
 06:11:30 15 upstream of PS1 and they called it PS0. And the pressures  
 06:11:36 16 from PS1 and PS0 were fed to opposite sides of a diaphragm.  
 06:11:43 17 And when the pressure ratio changed from being higher on the  
 06:11:52 18 PS1 side to being lower on the PS1 side, the diaphragm would  
 06:11:57 19 move and that would change some electrical contacts.  
 06:12:01 20 Q. Did the shock switch that was used in the L1011 APU  
 06:12:07 21 give any of indication of which side of this red double  
 06:12:12 22 value function you were operating on?  
 06:12:14 23 A. No.  
 06:12:15 24 Q. Did it tell you anything about whether you were in  
 06:12:19 25 supersonic flow, or had seen a shock?



06:12:23 1 A. The shock switch functioned when the pressures  
 06:12:27 2 reversed. That means that a shock front had passed through  
 06:12:31 3 PS0 and PS1.  
 06:12:36 4 Q. And if the shock front had passed through, does that  
 06:12:36 5 mean that there was supersonic flow?  
 06:12:38 6 A. Yes. That means supersonic flow.  
 06:12:40 7 Q. And if there is supersonic flow, do you know anything  
 06:12:43 8 about what --  
 06:12:44 9 A. Well, you know you are way up on that curve. A long,  
 06:12:49 10 long way from surge.  
 06:12:51 11 Q. Is that a higher flow condition?  
 06:12:53 12 A. Yes, a higher flow, yes, which has removed you from  
 06:12:56 13 surge.  
 06:13:02 14 Q. Did the shock switch prevent the APU from operating,  
 06:13:10 15 or prevent the load compressor from operating in supersonic  
 06:13:14 16 flow?  
 06:13:15 17 A. No. It just prevented the surge valve from opening  
 06:13:19 18 improperly.  
 06:13:21 19 MR. LEVINE: That is all I have. No further  
 06:13:22 20 questions.  
 06:13:23 21 THE COURT: Ms. Stevenson, you may  
 06:13:26 22 cross-examine.  
 06:13:27 23 MS. STEVENSON: Thank you, Your Honor.  
 06:13:29 24 CROSS-EXAMINATION  
 06:13:29 25 BY MS. STEVENSON:

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06:13:30 1 Q. Good afternoon, Mr. Brown.  
 06:14:11 2 A. Good afternoon.  
 06:14:12 3 Q. Do you have a college degree, Mr. Brown?  
 06:14:16 4 A. Yes.  
 06:14:16 5 Q. Would you tell us where you went to school and what  
 06:14:20 6 you got -- what you studied?  
 06:14:23 7 A. I went to Queens University in Kingston, Ontario,  
 06:14:27 8 Canada. I graduated in 1952 with a Bachelor of Science  
 06:14:32 9 degree in engineering physics.  
 06:14:35 10 In 1953 to '55 I went to the College of  
 06:14:38 11 Aeronautics of Cranfield in England and graduated with what  
 06:14:42 12 they called a diploma.  
 06:14:44 13 Q. Is that a graduate degree?  
 06:14:48 14 A. Yes.  
 06:14:48 15 Q. What field was that in?  
 06:14:48 16 A. My specialty was aircraft propulsion.  
 06:14:50 17 Q. Did you get any other graduate degrees after that?  
 06:14:53 18 A. Not after that.  
 06:14:53 19 Q. And did you begin working after that as an engineer?  
 06:14:57 20 A. Yes.  
 06:15:01 21 Q. How long did you work as an engineer?  
 06:15:04 22 A. From the time I finished the graduate degree, I worked  
 06:15:07 23 as an engineer right through to the time of my retirement at  
 06:15:07 24 the end of 1991.  
 06:15:09 25 Q. How many years does that span?

06:15:21 1 A. Well --  
 06:15:22 2 Q. It's a fair number of years?  
 06:15:24 3 A. About 35 years or so.  
 06:15:26 4 Q. It's fair to say you are fairly knowledgeable about  
 06:15:31 5 the topic of surge control that we have been talking about  
 06:15:33 6 today?  
 06:15:33 7 A. Yes.  
 06:15:34 8 Q. I want to talk briefly about the timing of the L1011  
 06:15:40 9 APU program. You said on your, during your direct  
 06:15:45 10 examination that the surge control system was not -- the  
 06:15:51 11 design for the L1011 APU system had not been finalized by  
 06:15:57 12 1969. Do you remember that testimony?  
 06:15:59 13 A. Yes.  
 06:16:00 14 Q. But in fact the basic design for the L1011 APU had  
 06:16:05 15 been finalized by 1969. Isn't that right?  
 06:16:08 16 A. No.  
 06:16:08 17 Q. Do you recall giving deposition testimony in December  
 06:16:12 18 of 2005 of this year?  
 06:16:15 19 A. Yes.  
 06:16:16 20 Q. In fact, you appeared at your deposition as Hamilton  
 06:16:19 21 Sundstrand's corporate representative on topics concerning  
 06:16:22 22 the L1011 APU. Isn't that right?  
 06:16:25 23 A. Yes.  
 06:16:28 24 MS. STEVENSON: Mr. Schlaifer, could we look at  
 06:16:30 25 Page 8, Lines 6 through 11, of Mr. Brown's deposition?

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06:16:30 1 BY MS. STEVENSON:  
 06:16:57 2 Q. Do you see there, you are asked, when was the L1011  
 06:17:00 3 APU design finalized?  
 06:17:02 4 And you testified the basic design would be in  
 06:17:06 5 the '69-70 time frame?  
 06:17:08 6 A. Yes.  
 06:17:09 7 Q. And that's because the Lockheed flew their first test  
 06:17:13 8 in 1970. Did you give that testimony?  
 06:17:15 9 A. Yes.  
 06:17:16 10 MR. LEVINE: Your Honor, I wonder if she could  
 06:17:19 11 read the lines right after that.  
 06:17:20 12 THE COURT: I will let her conduct the  
 06:17:22 13 cross-examination. You can redirect.  
 06:17:25 14 BY MS. STEVENSON:  
 06:17:25 15 Q. I want to turn now to another document that you looked  
 06:17:31 16 at with Mr. Levine during your direct testimony. It's  
 06:17:38 17 DTX-108. You should have that in the binder of documents up  
 06:17:43 18 there with you on the witness stand. This is -- if we turn  
 06:17:54 19 to the next page, Mr. Schlaifer -- just remind ourselves  
 06:17:58 20 that this is an October 28th, 1975 Hamilton Sundstrand memo  
 06:18:06 21 to which you are the first addressee. Is that correct?  
 06:18:09 22 A. Yes.  
 06:18:11 23 Q. And the subject line is a transmittal of report on the  
 06:18:16 24 L1011 APU surge control improvements. Do you see that?  
 06:18:22 25 A. Yes.



06:18:23 1 Q. And we are going to look at the first page of the text  
06:18:27 2 of the memo, which has Bates No. SUND 00673. Let's look at  
06:18:44 3 the summary section, 2-0. It says, the test program showed  
06:19:00 4 that significant improvements in surge system performance  
06:19:00 5 and reliability can be obtained with the proposed concepts.

06:19:10 6 Do you see that?

06:19:10 7 A. Yes.

06:19:11 8 Q. Then it goes on to say, the boosted pitot probe proved  
06:19:21 9 to be a superior alternative to the present diffuser pipe  
06:19:25 10 signal. Do you see that?

06:19:27 11 A. Yes.

06:19:28 12 Q. It provides for better system stability and response  
06:19:32 13 as well as overall system simplification.

06:19:35 14 Do you see that?

06:19:36 15 A. Yes.

06:19:36 16 Q. And do you agree that stability and response are good  
06:19:41 17 things in a surge control system?

06:19:43 18 A. Yes. But they are not the only consideration.

06:19:46 19 Q. And do you agree that system simplification is a good  
06:19:50 20 thing to have in a surge control system?

06:19:56 21 A. Yes. Simplification generally would be a good thing.

06:20:00 22 Q. And if we could just look in the paragraph above, the  
06:20:07 23 introduction. We should have looked at this first. It  
06:20:13 24 says, if you could blow up the first half, it says, this

06:20:13 25 report documents the L1011 APU testing that was conducted to

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06:20:26 1 investigate concepts that would significantly influence the  
06:20:31 2 performance and reliability of the load compressor surge  
06:20:34 3 control system.

06:20:35 4 Do you see that?

06:20:36 5 A. Yes.

06:20:37 6 Q. And the next paragraph says, the complete APU system  
06:20:41 7 was tested. Right?

06:20:43 8 A. Uh-huh.

06:20:43 9 Q. And specifically -- could you give verbal responses to  
06:20:52 10 the questions so the court reporter can get it?

06:20:55 11 A. Yes, I see that, yes.

06:20:56 12 Q. For number one, it says alternate compressor flow  
06:20:59 13 sensing signal source. Is that one of the specific things  
06:21:02 14 that was tested by Hamilton Sundstrand?

06:21:04 15 A. Yes.

06:21:05 16 Q. A boosted pitot probe versus the present load  
06:21:09 17 compressor diffuser pipe signal was investigated. Correct?

06:21:12 18 A. That's correct.

06:21:13 19 Q. And as a result of this study, Hamilton Standard  
06:21:24 20 concluded that there were certain advantages to using a  
06:21:24 21 boosted pitot. Is that correct?

06:21:24 22 A. Yes.

06:21:28 23 Q. So am I correct that the L1011 APU went into  
06:21:47 24 commercial service in 1973 and in 1975 Hamilton Standard was  
06:21:52 25 trying to make significant improvements in its surge control

06:21:56 1 system?

06:21:57 2 A. That is correct.

06:22:12 3 Q. Now, your personal involvement in the L1011 APU  
06:22:20 4 program ended in approximately 1976. Correct?

06:22:26 5 A. Yes.

06:22:27 6 Q. Did you leave Hamilton Sundstrand at that time or you  
06:22:30 7 just left the L1011 program?

06:22:32 8 A. I left the L1011 program.

06:22:34 9 Q. So you have no personal knowledge of any changes that  
06:22:39 10 might have occurred to the L1011 APU surge control system  
06:22:43 11 after 1976. Correct?

06:22:45 12 A. I have very -- a lot of indirect knowledge, because I  
06:22:50 13 didn't move -- I was sitting 50 feet from the people who  
06:22:53 14 were continuing to work on it. I had lunch with them.

06:22:55 15 Q. My question was, did you have any direct knowledge,  
06:22:58 16 personal knowledge, of any changes that might have been made  
06:23:00 17 to the L1011 APU surge control system after 1976?

06:23:05 18 A. The best answer I can give you is I have no specific  
06:23:08 19 recollection of somebody telling me that this was not  
06:23:11 20 incorporated.

06:23:13 21 Q. And you don't have any personal knowledge of any other  
06:23:16 22 changes that might have been made to the L1011 APU surge  
06:23:20 23 control system after 1976 because you weren't working on the  
06:23:23 24 program. Right?

06:23:25 25 A. Yes.

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06:23:25 1 Q. Now, was the surge control system of the L1011 APU  
06:23:31 2 designed to maintain compressor bleed flow so that the flow  
06:23:36 3 stayed a safe distance from the compressor's surge flow  
06:23:41 4 rate?

06:23:43 5 A. Yes.

06:23:44 6 Q. And was the surge control system of the L1011 APU  
06:23:48 7 designed to maintain minimum compressor bleed flow rate only  
06:23:55 8 slightly above the compressor's surge flow rate?

06:23:57 9 A. Yes.

06:24:07 10 Q. I want to talk briefly about the drawing that you did  
06:24:11 11 for Mr. Levine during your direct examination. I think it  
06:24:16 12 was marked HSC Demonstrative 18. To be clear, that is a  
06:24:21 13 drawing you created today in 2006. Correct?

06:24:33 14 A. Yes.

06:24:33 15 Q. And you say that you originally saw drawings like that  
06:24:37 16 back in the early 1970s when you were working on the L1011  
06:24:41 17 APU?

06:24:42 18 A. Yes.

06:24:42 19 Q. And the only way that you discovered that the flow  
06:24:48 20 looked like that on the L1011 APU was through a series of  
06:24:52 21 testing. Correct?

06:24:53 22 A. That's correct.

06:24:53 23 Q. And you say that the last time that you saw original  
06:24:58 24 data that looked like that that you were involved in testing  
06:25:02 25 was back in the early 1970s?

06:25:04 1 A. Yes.  
 06:25:05 2 Q. Let's take a look at DTX-104. This is the memo from  
 06:25:41 3 1975 from Hamilton Sundstrand. You are not copied on this  
 06:25:47 4 memo. Correct?  
 06:25:47 5 A. That is correct.  
 06:25:47 6 Q. If we take a look at the last page, I think Mr. Levine  
 06:25:55 7 said that this is a curve that's like the one you drew, but  
 06:26:00 8 you didn't see this curve at the time in 1975. Right? You  
 06:26:06 9 are not copied on this memo?  
 06:26:07 10 A. Well, I looked at a lot of memos at that time. The  
 06:26:12 11 fact that it was not addressed specifically to me doesn't  
 06:26:16 12 mean that I wouldn't have looked at it with other people who  
 06:26:19 13 did. Mr. Emmons -- let's see.  
 06:26:22 14 Q. Are you an addressee of this memo?  
 06:26:24 15 A. No. But I sat besides Mr. Emmons at the time.  
 06:26:29 16 Q. If you go back to Page 1 again of the memo, do you see  
 06:26:35 17 the -- could you blow up the subject line of this memo?  
 06:26:42 18 A. I beg your pardon?  
 06:26:44 19 Q. I am talking to our technical assistant, Mr.  
 06:26:49 20 Schlaifer.  
 06:26:49 21 You see here it says, Mr. Brown, that the  
 06:26:52 22 subject matter of this memo is the L1011 APU surge control  
 06:26:56 23 redesign feasibility study? Do you see that?  
 06:27:00 24 A. Yes, I see that.  
 06:27:00 25 Q. Now, if we look at the second paragraph for a second,

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06:27:07 1 and blow that up, it says, this report has been written to  
 06:27:11 2 provide a summary of the control dynamics group redesign  
 06:27:15 3 effort performed in 1973 on the L1011 APU surge control. Do  
 06:27:22 4 you see that?  
 06:27:22 5 A. Yes.  
 06:27:23 6 Q. Now, let's look back again at this curve on Figure 9,  
 06:27:32 7 and see what is being plotted there. The pressure sensors,  
 06:27:41 8 if we look on the left side, on the Y axis, we have three --  
 06:27:57 9 the ratio there is PG3 minus PG2 over PG2. Do you see that?  
 06:28:05 10 A. Yes, I see that.  
 06:28:06 11 Q. Now, those are not the same pressure readings,  
 06:28:10 12 pressure ratio -- pressure readings that we saw in the L1011  
 06:28:15 13 earlier when we were looking --  
 06:28:20 14 A. Which exhibit is this again?  
 06:28:22 15 Q. What exhibit are we looking at on the screen?  
 06:28:25 16 A. Yes.  
 06:28:25 17 Q. We are looking at Exhibit 104.  
 06:28:27 18 A. Okay.  
 06:28:27 19 Q. And those are not the same pressure readings that we  
 06:28:31 20 were looking at in the Master Key document. Correct?  
 06:28:37 21 A. They are the same pressures with different labels on  
 06:28:37 22 them.  
 06:28:38 23 Q. Okay. The labels that we saw earlier were P0, P1, P2  
 06:28:43 24 and PT. Correct? You showed us those --  
 06:28:47 25 A. PS0, PS1, PS2 and PT.

06:28:50 1 Q. Right. And you testified that those were the names of  
 06:28:52 2 the pressure readings in the L1011. Right?  
 06:28:55 3 A. Yes.  
 06:28:56 4 Q. Okay. And these are, we see, PG3, PG2, PG3 and PG  
 06:29:03 5 Right?  
 06:29:04 6 A. Correct.  
 06:29:04 7 Q. Okay. And if we flip back in this same document to  
 06:29:08 8 Page 2775, 275 of DTX-104, you will see that PG2 and PG3 are  
 06:29:32 9 defined. See, sensed, static sensed static pressure signal  
 06:29:38 10 and sensed total pressure?  
 06:29:39 11 A. Yes. That's correct.  
 06:29:40 12 Q. In Table II, if we turn back one page more, this is  
 06:29:47 13 the new design concept table. Do you see that?  
 06:29:54 14 A. Table 2, yes.  
 06:29:55 15 Q. So PG2 and PG3 are being defined in the new design  
 06:30:01 16 concept table. Correct?  
 06:30:03 17 A. Yes.  
 06:30:06 18 Q. If you can go back one page more. Let's look at 275  
 06:30:20 19 again. So what's being compared in Figure 9, according to  
 06:30:27 20 these definitions of PG2 and PG3, are sensed static pressure  
 06:30:33 21 and sensed total pressure. Correct?  
 06:30:35 22 A. That's what it says, yes.  
 06:30:56 23 Q. You told me a minute ago that the surge control system  
 06:30:59 24 on the L1011 APU was designed to maintain the compressor  
 06:31:06 25 bleed flow so that flow stayed a safe distance from the

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06:31:10 1 compressor's surge flow rate. Correct?  
 06:31:14 2 A. That is correct.  
 06:31:14 3 Q. How far above the compressor's surge flow rate was it  
 06:31:20 4 designed to stay?  
 06:31:22 5 A. If you could flip back to Figure 9. The surge for  
 06:31:36 6 this -- at this particular point, the surge line itself  
 06:31:49 7 would be where that value is of 155. And the surge control  
 06:31:55 8 was set to operate around a 174. That would be the margin  
 06:32:00 9 in flow, from 155 to 174. That's the margin that the  
 06:32:06 10 control tried to apply.  
 06:32:11 11 MS. STEVENSON: I have no further questions.  
 06:32:12 12 Thank you, Mr. Brown.  
 06:32:18 13 THE COURT: Redirect?  
 06:32:22 14 MR. LEVINE: Yes.  
 06:32:23 15 Your Honor, for redirect, there is some  
 06:32:35 16 questioning on cross on Exhibit 104. We want to renew our  
 06:32:39 17 request. I think it was, the objection was overruled  
 06:32:43 18 without prejudice. We want to renew our request to admit  
 06:32:45 19 Exhibit 104 given the foundation that was laid about the  
 06:32:48 20 document.  
 06:32:48 21 MR. PUTNAM: In light of the testimony, I am  
 06:32:50 22 happy to have the document enforcement we will have the  
 06:32:52 23 testimony on that document.  
 06:32:55 24 MR. LEVINE: Okay.  
 06:32:56 25 MR. PUTNAM: I withdraw the objection.

06:56:35 1 A. Yes, there are.  
 06:56:38 2 MR. SWANSON: I have no further questions for  
 06:56:41 3 this witness.  
 06:56:43 4 THE COURT: Cross-examine.  
 06:56:45 5 MR. PUTNAM: Could you give us one minute, Your  
 06:56:47 6 Honor?  
 06:56:49 7 THE COURT: Sure.  
 06:56:51 8 (Pause.)  
 06:56:53 9 MR. KRUPKA: Your Honor, we decided that I drew  
 06:56:55 10 the straw.  
 06:56:57 11 CROSS-EXAMINATION  
 06:56:59 12 BY MR. KRUPKA:  
 06:57:01 13 Q. Mr. Telakowski, my name is Bob Krupka. I represent  
 06:57:03 14 Honeywell.  
 06:57:05 15 The baseline APU for the L1011 had a surge  
 06:57:07 16 control system. Correct?  
 06:57:09 17 A. Yes, it did.  
 06:57:11 18 Q. And did the baseline unit, APU, what we are calling  
 06:57:13 19 the baseline unit, did the same basic surge control system  
 06:57:15 20 remain in it throughout the period of its manufacture?  
 06:57:17 21 A. Yes, it did.  
 06:57:19 22 Q. And all the way up through 1985, Hamilton Sundstrand  
 06:57:21 23 and Lockheed didn't see a need to upgrade or modify that  
 06:57:23 24 surge control system for the baseline L1011 APU. Correct?  
 06:57:25 25 A. I believe that's true, yes.

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06:59:16 1 MR. KRUPKA: No further questions, Your Honor.  
 06:59:18 2 THE COURT: Anything else?  
 06:59:20 3 MR. LIND: Your Honor, we are prepared to rest.  
 06:59:22 4 THE COURT: With this witness?  
 06:59:24 5 MR. SWANSON: No further questions, Your Honor.  
 06:59:26 6 I apologize.  
 06:59:28 7 (Witness excused.)  
 06:59:30 8 MR. LIND: Your Honor, we don't have any more  
 06:59:32 9 witnesses. We do have a couple of document issues that I  
 06:59:34 10 would like to take care of before we close. We have I think  
 06:59:36 11 about 11 documents left that fall into probably three  
 07:00:03 12 categories. If you want to give me one last shot, I did it  
 07:00:07 13 up until midnight last night, but I might take another two  
 07:00:10 14 minutes.  
 07:00:11 15 THE COURT: Go ahead and do that.  
 07:00:13 16 (Pause.)  
 07:00:15 17 MR. KRUPKA: Your Honor, first of all I want to  
 07:00:22 18 thank the Court for its indulgence in starting early today  
 07:00:25 19 so we could hopefully conclude in time for me to get to New  
 07:00:36 20 York. I really do appreciate it. And I will extend your  
 07:00:39 21 greetings to Judge Lancaster. And I will express my  
 07:00:43 22 appreciation to you for allowing me to escort him.  
 07:00:45 23 Secondly, is the Court intending to cover  
 07:00:47 24 anything further.  
 07:00:49 25 THE COURT: No, if you need to leave, you can

07:00:45 1 leave, Mr. Krupka.  
 07:00:47 2 MR. KRUPKA: Thank you, Your Honor.  
 07:00:54 3 MR. PUTNAM: Your Honor, before Mr. Putnam --  
 07:00:57 4 THE COURT: Enjoy the dinner Mr. Krupka.  
 07:00:58 5 MR. KRUPKA: Thank you, Your Honor.  
 07:00:59 6 MR. PUTNAM: Before Mr. Krupka leaves and we put  
 07:01:03 7 on our extensive rebuttal case in its absence, May 9 for  
 07:01:07 8 closing arguments, can the Court indicate how much time it  
 07:01:12 9 has set aside. I have another matter in Philadelphia that  
 07:01:15 10 day. I would like to inform the tribunal in that case  
 07:01:18 11 approximately when I will be able to return.  
 07:01:20 12 THE COURT: Let me take a quick look.  
 07:01:22 13 MR. PUTNAM: I have informed them I will be here  
 07:01:25 14 as long as the Court needs. I am not suggesting in any way  
 07:01:28 15 a time limit. I am hoping to get some guidance how long the  
 07:01:32 16 Court expects to have for us on May 9th.  
 07:01:34 17 THE COURT: Right now your argument is the only  
 07:01:38 18 matter presently on my docket for May 9. I would seek some  
 07:01:44 19 guidance from counsel.  
 07:01:45 20 MR. KRUPKA: Your Honor, I think, I guess --  
 07:01:48 21 MR. LIND: Why don't we talk about that. I  
 07:01:55 22 guess you are looking at how much to set aside, aren't you?  
 07:01:58 23 I don't see all day.  
 07:02:00 24 THE COURT: I wouldn't imagine that we would  
 07:02:04 25 need even a half-day. Do you want a half-day, I will give

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07:02:08 1 you that. I wouldn't think you would want to talk to me  
 07:02:15 2 that long.  
 07:02:18 3 MR. KRUPKA: I would be satisfied with an hour  
 07:02:21 4 each side, Your Honor.  
 07:02:24 5 THE COURT: Is that acceptable?  
 07:02:26 6 MR. LEVINE: How about an hour-and-a-half per  
 07:02:28 7 side.  
 07:02:29 8 MR. KRUPKA: That will work.  
 07:02:30 9 THE COURT: That is fine. That is a half-day.  
 07:02:34 10 MR. KRUPKA: Your Honor, if I understand  
 07:02:35 11 correctly what the stipulation is with respect to what  
 07:02:38 12 happens now is that we present to the Court simultaneous  
 07:02:44 13 proposed findings and conclusions.  
 07:02:45 14 THE COURT: That's what I think we agreed upon  
 07:02:47 15 at the pretrial conference.  
 07:02:48 16 MR. KRUPKA: If I understand, and recall  
 07:02:51 17 correctly, just so we are all on the same page, that that  
 07:02:54 18 doesn't involve further briefing, just proposed findings.  
 07:02:58 19 THE COURT: And conclusions, yes.  
 07:03:00 20 MR. KRUPKA: Okay. Appreciate that  
 07:03:02 21 clarification, Your Honor. I will, while they are  
 07:03:04 22 discussing these important evidentiary objections, I will  
 07:03:07 23 take my leave. Thank you again, Your Honor.  
 07:03:10 24 THE COURT: Good to see you again, Mr. Krupka.  
 07:03:12 25 MR. KRUPKA: We will see you on May 9th. Thank